

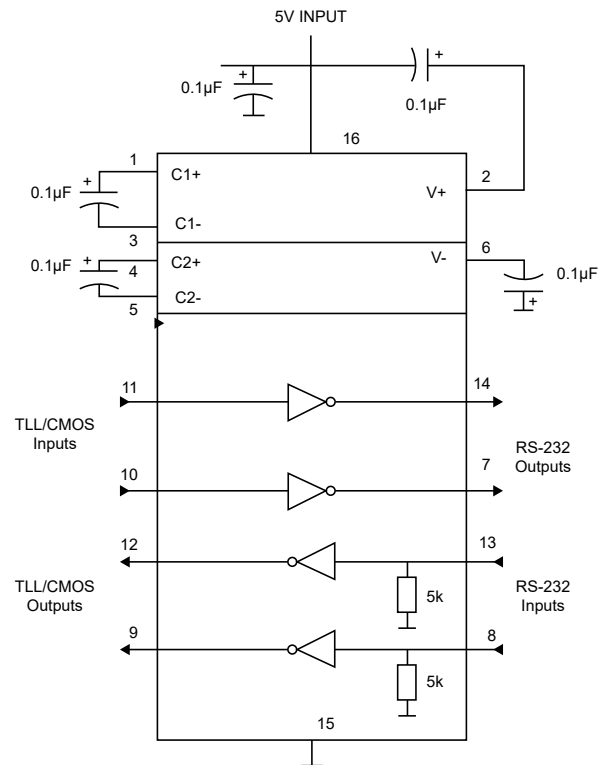
## 1. Description

The UMW ST232 have two drives and two receivers.  
The drivers and receivers meet all EIA/TIA-232E and CCITT V.28 specifications at data rates up to 120 kbps when loaded in accordance with the EIA/TIA-232E specification

## 2. Features

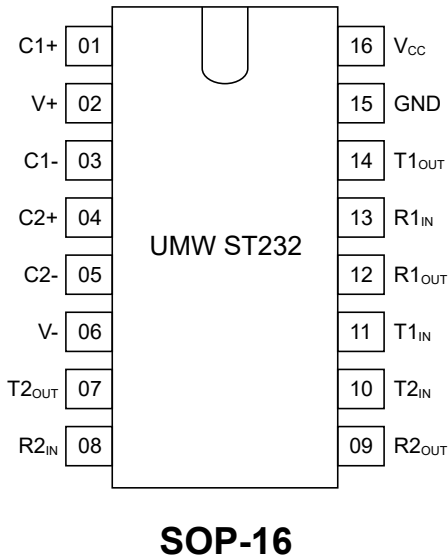
- Operate from Single +5V Power Supply
- Guaranteed 120 kbps Data Rate
- Latchup Free
- ESD Protection  $\pm 2\text{kV}$

## 3. Typical Operating Circuit





4.Pinning Information



| Pin No | Symbol            | Function                                                |
|--------|-------------------|---------------------------------------------------------|
| 01     | C1+               | Terminal for positive charge-pump capacitor             |
| 02     | V+                | +2 V <sub>CC</sub> voltage generated by the charge-pump |
| 03     | C1-               | Terminal for positive charge-pump capacitor             |
| 04     | C2+               | Terminal for negative charge-pump capacitor             |
| 05     | C2-               | Terminal for negative charge-pump capacitor             |
| 06     | V-                | -2 V <sub>CC</sub> voltage generated by the charge-pump |
| 07     | T2 <sub>OUT</sub> | RS-232 Driver Output                                    |
| 08     | R2 <sub>IN</sub>  | RS-232 Receiver Input                                   |
| 09     | R2 <sub>OUT</sub> | RS-232 Receiver Output                                  |
| 10     | T2 <sub>IN</sub>  | RS-232 Driver Input                                     |
| 11     | T1 <sub>IN</sub>  | RS-232 Driver Input                                     |
| 12     | R1 <sub>OUT</sub> | RS-232 Receiver Output                                  |
| 13     | R1 <sub>IN</sub>  | RS-232 Receiver Input                                   |
| 14     | T1 <sub>OUT</sub> | RS-232 Driver Output                                    |
| 15     | GND               | Ground                                                  |
| 16     | V <sub>CC</sub>   | + 4.5 V to 5.5 V Supply Voltage Input                   |



5.Absolute Maximum Ratings

| Parameter                        |          | Symbol    | Value                              | Units |
|----------------------------------|----------|-----------|------------------------------------|-------|
| Supply voltage                   |          | $V_{CC}$  | -0.3 to 6                          | V     |
| Transmitter input voltage range  |          | $T_{IN}$  | -0.3 to ( $V_{CC}+0.3$ )           | V     |
| Receiver input voltage range     |          | $R_{IN}$  | $\pm 30$                           | V     |
| Transmitter output voltage range |          | $T_{OUT}$ | ( $V_{+}+0.3$ ) to ( $V_{-}-0.3$ ) | V     |
| Receiver output voltage range    |          | $R_{OUT}$ | -0.3 to ( $V_{CC}+0.3$ )           | V     |
| Storage temperature              |          | $T_{STG}$ | -60 to 150                         | °C    |
| Operating voltage range          | ST232CDR | $T_A$     | 0 to 70                            | °C    |
|                                  | ST232BDR |           | -40 to 85                          | °C    |



## 6. Electrical Characteristics

$V_{CC}=4.5V$  to  $5.5V$ ,  $C1-C4 = 0.1\mu F$ ;  $T_A = -40$  to  $+85^\circ C$  unless otherwise noted)

| Parameter                      | Symbol       | Conditions                                          | Min     | Max      | Units      |
|--------------------------------|--------------|-----------------------------------------------------|---------|----------|------------|
| <b>DC CHARACTERISTICS</b>      |              |                                                     |         |          |            |
| Operating Voltage Range        | $V_{CC}$     | $V_{IL}=0V$                                         | 4.5     | 5.5      | V          |
| $V_{CC}$ Supply Current        | $I_{CC}$     | No load, $T_A = 25^\circ C$                         |         | 10       | mA         |
| <b>LOGIC</b>                   |              |                                                     |         |          |            |
| Input Leakage Current          | $I_I$        | $T_{IN}=0V$ to $V_{CC}$                             | 0.2     | $\pm 10$ | $\mu A$    |
| Input Threshold Low            | $V_{IL}$     | $T_{IN}$                                            |         | 0.8      | V          |
| Input Threshold High           | $V_{IH}$     | $T_{IN}$                                            | 2       |          | V          |
| Output Voltage Low             | $V_{OL}$     | $R_{OUT}$ , $I_{OUT}=3.2mA$                         |         | 0.4      | V          |
| Output Voltage High            | $V_{OH}$     | $R_{OUT}$ , $I_{OUT}=-1mA$                          | 3.5     |          | V          |
| <b>RECEIVER INPUTS</b>         |              |                                                     |         |          |            |
| Input Voltage Range            | $V_{RIN}$    | All parts, normal operation                         | -30     | 30       | V          |
| Input Threshold Low            | $V_{ff}$     | $T_A=+25^\circ C$ , $V_{CC}=5V$                     | 0.8     |          | V          |
| Input Threshold High           | $I_{on}$     | $T_A=+25^\circ C$ , $V_{CC}=5V$                     |         | 2.4      | V          |
| Input Hysteresis               | $V_h$        | $V_{CC}=5V$                                         | 0.2     | 1        | V          |
| Input Resistance               | $R_I$        | $T_A=+25^\circ C$ , $V_{CC}=5V$                     | 3       | 7        | k $\Omega$ |
| <b>TRANSMITTER OUTPUTS</b>     |              |                                                     |         |          |            |
| Output Voltage Swing           | $\Delta V_O$ | All driver inputs loaded with 3k $\Omega$ to ground | $\pm 5$ |          | V          |
| Output resistance              | $R_O$        | $V_{CC}=V+=V-=0V$ , $V_{OUT}=+2V$                   | 300     |          | $\Omega$   |
| Output Short - Circuit Current | $I_{SC}$     |                                                     |         | $\pm 60$ | mA         |



| Parameter                     | Symbol                   | Conditions                                                                                                                                     | Min | Max | Units      |
|-------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|------------|
| TIMING CHARACTERISTICS        |                          |                                                                                                                                                |     |     |            |
| Maximum Data Rate             | ST                       | $R_L=3k\Omega$ to 7 k $\Omega$<br>$C_L=50pF$ to 1000pF<br>onetransmitter switcing                                                              | 120 |     | kbps       |
| Reseiver Propagation Delay    | $t_{PLHR}$<br>$t_{PHLR}$ | $C_L=150pF$<br>All parts, normal operation(Fig. 1)                                                                                             |     | 10  | $\mu S$    |
| Transmitter Propagation Delay | $t_{PLHT}$<br>$t_{PHLT}$ | $R_L=3k\Omega$ , $C_L=2500pF$<br>all transmitters loaded (Fig.2)                                                                               |     | 6   | $\mu S$    |
| Transition-Region Slew Rate   | SR                       | $T_A=25^{\circ}C$ , $V_{CC}= 5V$<br>$R_L=3k\Omega$ to 7 k $\Omega$<br>$C_L=50pF$ to 2500pF<br>measured from _3V to +3V<br>or +3V to -3V(Fig.3) | 3   | 30  | V/ $\mu S$ |



## 7. Timing Diagram

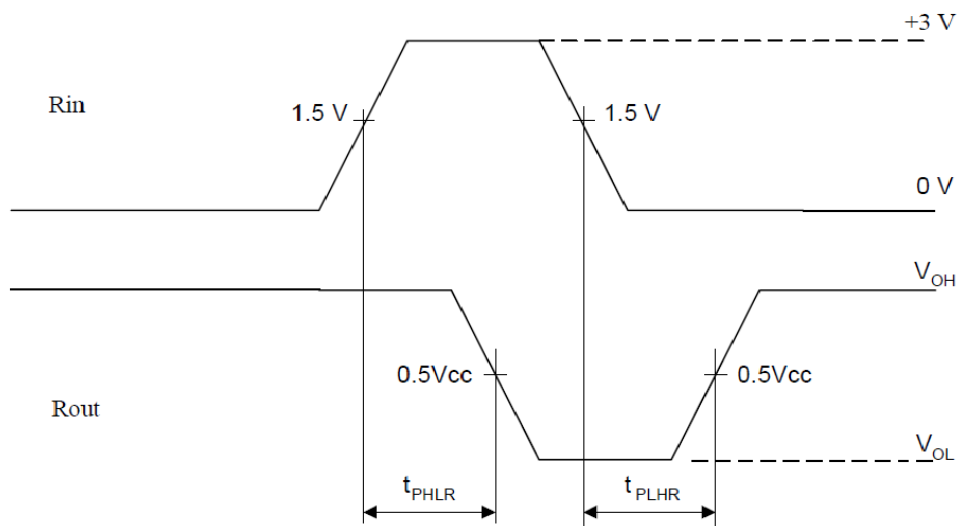


Figure 1

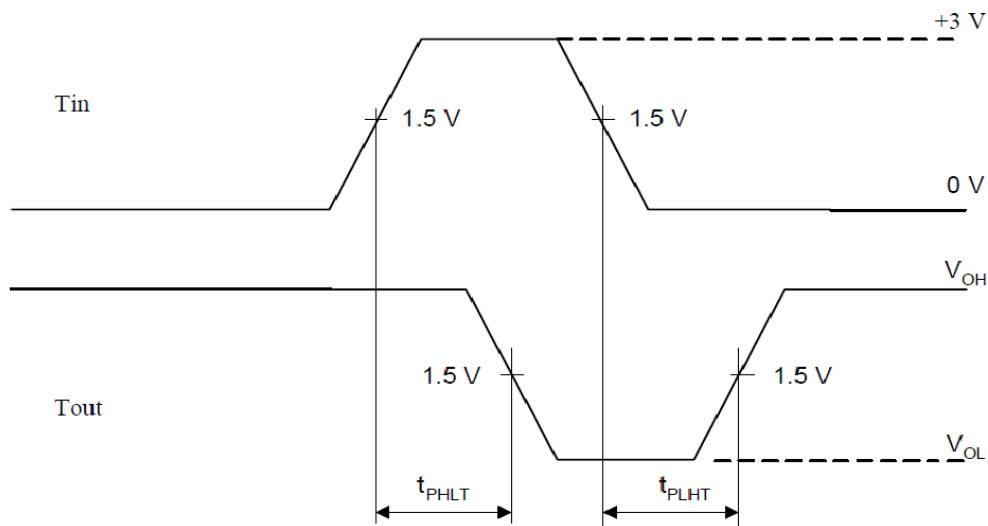


Figure 2

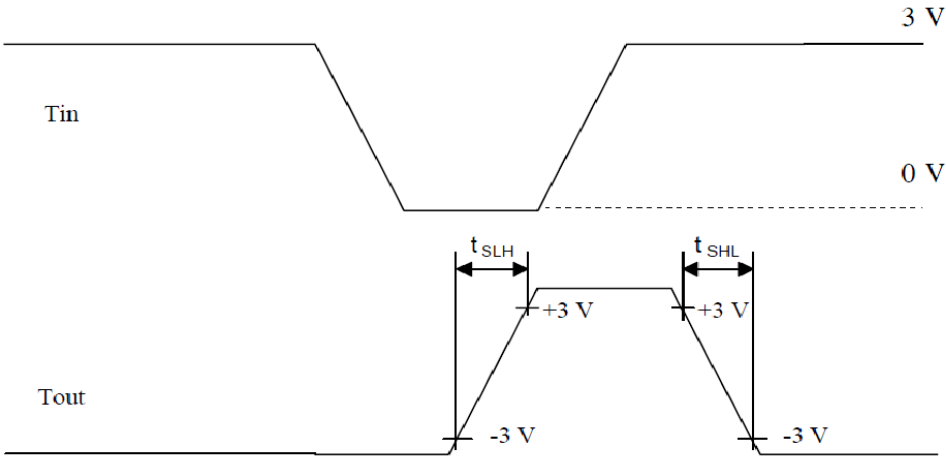
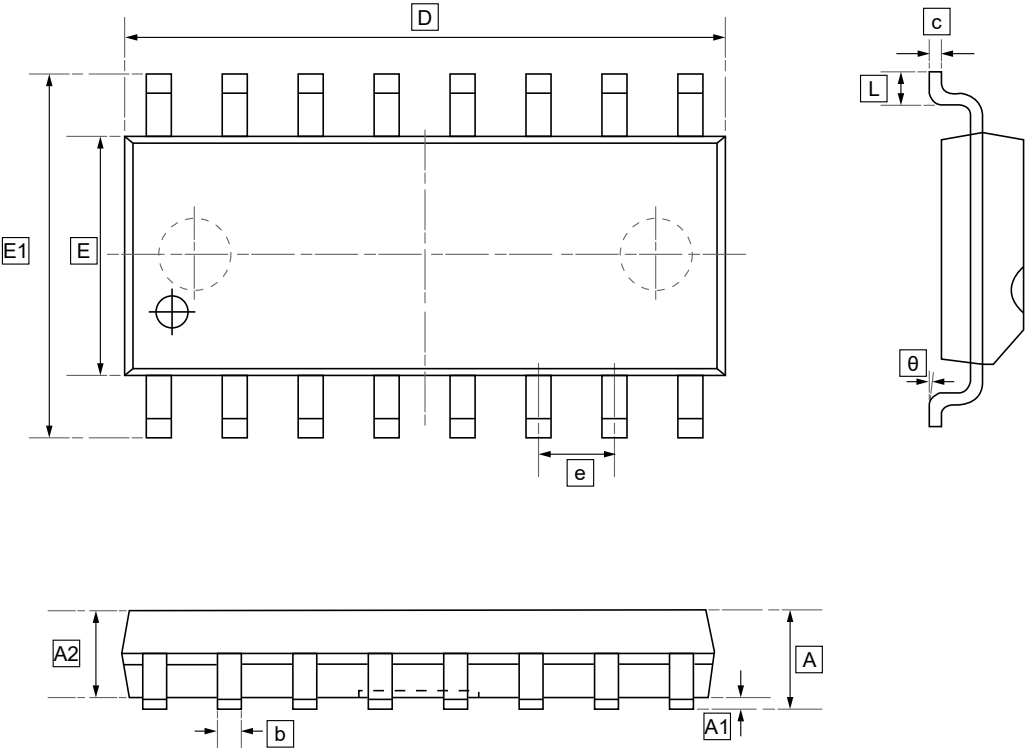


Figure 3



8.SOP-16 Package Outline Dimensions

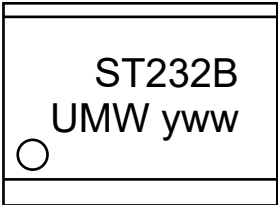


DIMENSIONS (mm are the original dimensions)

| Symbol | A     | A1    | A2    | b     | c     | D      | E     | E1    | e     | L     | θ  |
|--------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|----|
| Min    | 1.350 | 0     | 1.350 | 0.330 | 0.170 | 9.800  | 3.800 | 5.800 | 1.270 | 0.400 | 0° |
| Max    | 1.750 | 0.100 | 1.550 | 0.510 | 0.250 | 10.200 | 4.000 | 6.200 | BSC   | 1.270 | 8° |



9.Ordering information



yww: Batch Code

| Order Code   | Marking | Package | Base QTY | Delivery Mode |
|--------------|---------|---------|----------|---------------|
| UMW ST232BDR | ST232B  | SOP-16  | 2500     | Tape and reel |
| UMW ST232CDR | ST232C  | SOP-16  | 2500     | Tape and reel |



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